New claims

1. A security element (1, 2, 7, 8) for RF identification, wherein the security element has a flexible, electrically non-conducting substrate layer (11, 24) and a first electrically conductive layer (29) of an electrically conducting material which is applied to the substrate layer and which in a first surface region (4, 51, 53, 63, 64, 65) is shaped out in pattern form to form an RF component (12, 72, 81), wherein a first relief structure (27, 28, 60) with grooves for altering electrical properties of the RF component is shaped at least in region-wise manner in the surface region, associated with the RF component, in the first electrically conductive layer (29),

characterised in that

the first electrically conductive layer (29) is shaped out in the first surface region (2, 51, 53, 63, 64, 65) in the form of an RF antenna (12) or a coil, that in the region of the conductive layer (29) which is associated with the RF antenna (12) or the coil the grooves of the relief structure (27, 28, 60) are oriented on average more longitudinally relative to the direction of flow of the electric current than transversely with respect to the direction of flow of the electric current, and that the relief structure (27, 28, 60) has a profile depth in the range of 50 nm to 10 m and a spatial frequency in the range of 100 to 2000 lines per mm, wherein the grooves of the relief structure (27, 28, 60) are provided both in the surface of the first electrically conducting layer (29), which is towards the substrate layer (11, 24), and also in the surface of the first electrically conducting layer (29), which is remote from the substrate layer (11, 24).

2. A security element according to claim 1 characterised in that the substrate (24) is a replication layer and the first relief structure (27) is shaped in the surface of the replication layer (27) which is towards the first electrically conductive layer.

3. A security element according to one of the preceding claims characterised in that the first electrically conductive layer (29) is a metal layer applied to the substrate layer (24).

4. A security element according to one of the preceding claims characterised in that the first electrically conductive layer (29) is of a thickness in the range of 50 nm to 50 m, preferably 1 to 10 m.

5. A security element according to claim 1 characterised in that the grooves of the relief structure (27) in the region of the electrically conductive layer which is associated with the RF antenna or coil are oriented longitudinally with respect to the direction of flow of the electric current.

6. A security element according to one of claims 1 to 5 characterised in that the first electrically conductive layer (29) in the first surface region (2) is shaped out in the form of one or more conductor tracks of a width of 50 m to 10 mm, preferably 100 m.

7. A security element according to one of the preceding claims characterised in that the security element has a second electrically conductive layer (76) and that the first and the second electrically conductive layers (73, 76) form a capacitive element (70) in the first surface region.

8. A security element according to claim 7 characterised in that a second relief structure (7) is shaped at least in region-wise manner in the surface region associated with the capacitive element (70) in the second conductive layer (76).

9. A security element according to claim 7 or claim 8 characterised in that the first relief structure (78) has a plurality of mutually crossing grooves.

10. A security element according to one of the preceding claims characterised in that the first relief structure (27) is of a sawtooth, triangular, rectangular or sine profile.

11. An optical security element according to one of the preceding claims characterised in that the first relief structure (60) is formed from the superimposition of a coarse structure and a fine structure.

12. A security element according to one of the preceding claims characterised in that the first relief structure additionally produces an optical security feature.

13. A security element according to one of the preceding claims characterised in that the security element has a resonance circuit for RF identification.

14. A security element according to one of the preceding claims characterised in that the security element has a chip.

15. A security element according to one of the preceding claims characterised in that the security element is a film element, in particular a stamping film, a laminating film, a sticker film or a partial element of a transfer layer portion of such a film.

16. A process for the production of a security element for RF identification, wherein in the process a first conductive layer (29) of an electrically conducting material shaped out in pattern form to form an RF component (12) is applied to a flexible, electrically non-conducting substrate layer (24) in a first surface region of the substrate layer, wherein a first relief structure (27) with grooves for altering electrical properties of the RF component is shaped at least in region-wise manner in the surface region (2) associated with the RF component in the first conductive layer (29), wherein

in the first surface region the first electrically conductive layer (29) is shaped out in the form of an RF antenna or a coil, wherein in the region of the conductive layer (29) which is associated with the RF antenna (12) or the coil the grooves of the relief structure (27, 28, 60) are oriented on average more longitudinally relative to the direction of flow of the electric current than transversely with respect to the direction of flow of the electric current, and wherein the relief structure (27, 28, 60) has a profile depth in the range of 50 nm to 10 m and a spatial frequency in the range of 100 to 2000 lines per mm, wherein the grooves of the relief structure (27, 28, 60) are provided both in the surface of the first electrically conducting layer (29), which is towards the substrate layer (11, 24), and also in the surface of the first electrically conducting layer (29), which is remote from the substrate layer (11, 24).

17. A process according to claim 16 characterised in that the first conductive layer (29) is applied to the substrate layer over the full surface area, for example by vapour deposition, and then partially demetallised in pattern form to form the RF component (12).

18. A process according to claim 16 or claim 17 characterised in that two or more capacitive partial elements connected with connecting tracks are shaped out in the first conductive layer and that connecting tracks to capacitive partial elements are later severed for fine tuning of the resonance frequency.